Menoufiya University	**Department: Electrical Engineering**
Faculty of Engineering	**Post Graduate Course, Diploma**
Shebin El-Kom	**Time allowed: 3 Hours**
Second Semester Examination	**Course Title/Code: Management and Operation**
Academic Year: 2013-2014	**of Electrical Power Systems / ELE 511**
Date: 23 /1 /2014	

Minufiya University

Allowed Tables and Charts: None

Answer the following questions: **[100Mark]**

Question (1) **[40Mark]**

(a) **Explain the economic power dispatch problem.** **(10Mark)**

(b) **Using least square method, compute the cost coefficients of fuel cost function represented by** **(10Mark)**

$$F_i(P_i) = a_i P_i^2 + b_i P_i + c_i$$

(c) **The incremental costs for a plant consisting of three units are:** **(20Mark)**

$df_1/dp_1 = 0.03\ P_1 + 6$ $/MWh

$df_2/dp_2 = 0.09\ P_2 + 3$ $/MWh

$df_3/dp_3 = 0.02\ P_3 + 4$ $/MWh

Assume the total load varies from 150 to 450 MW with step 50 MW and the power output limits are $25 \le P_1 \le 150$ MW and $50 \le P_2 \le 100$ MW. Find the incremental fuel cost of the plant and the allocation of load between units for the minimum cost of operation.

Question (2) **[30Mark]**

(a) **Neglecting transmission losses, drive the condition for optimal operation of electrical power system.** **(10Mark)**

(b) **A power system has two thermal generating units with parameters:** **(20Mark)**

$a_1 = 4.036 * 10^{-3}$ $a_2 = 4.812 * 10^{-3}$

$b_1 = 5.93$ $b_2 = 6.02$

Given that this system has the following B-coefficients,

$B_{11} = 3.95 * 10^{-4}$ $B_{22} = 4.63 * 10^{-4}$

and the total generated power from the two units is 700 MW, Calculate:

1. The incremental fuel cost
2. Efficiency of the system

Question (3) **[30Mark]**

(a) **Explain:**

The constraints of unit commitment problem - The difference between economic power dispatch problem and unit commitment problem. **(10Mark)**

(b) **A power system has 3 thermal generating units with parameters listed in the table below. Determine the most economical units to be committed for a load of 4 MW. Let the load change be in step of 1 MW. The cost function equation is: $F_i(x) = a_i P_i^2 + b_i P_i + c_i$ and the power of each unit varies from 1.0 MW to 5.0 MW. Use Dynamic programming method.** **(20Mark)**

Units	Cost curve coefficients		
	a_i	b_i	c_i
1	0.77	47.0	50
2	1.60	53.0	50
3	2.00	60.0	50

Good Luck, Dr. Shaimaa Rabah

ملحوظة:هذا الجدول خاص بالجوده ولا يعنى الطالب

Field	National Academic Reference Standard(NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	a1-1, a13-1, a23-1	b1-1, b7-1, b13-1, b16-1, b16-2	C7-1, c17-1,	
Question No.	1, 2,3,4	1, 2,3,4	1, 2,3,4	